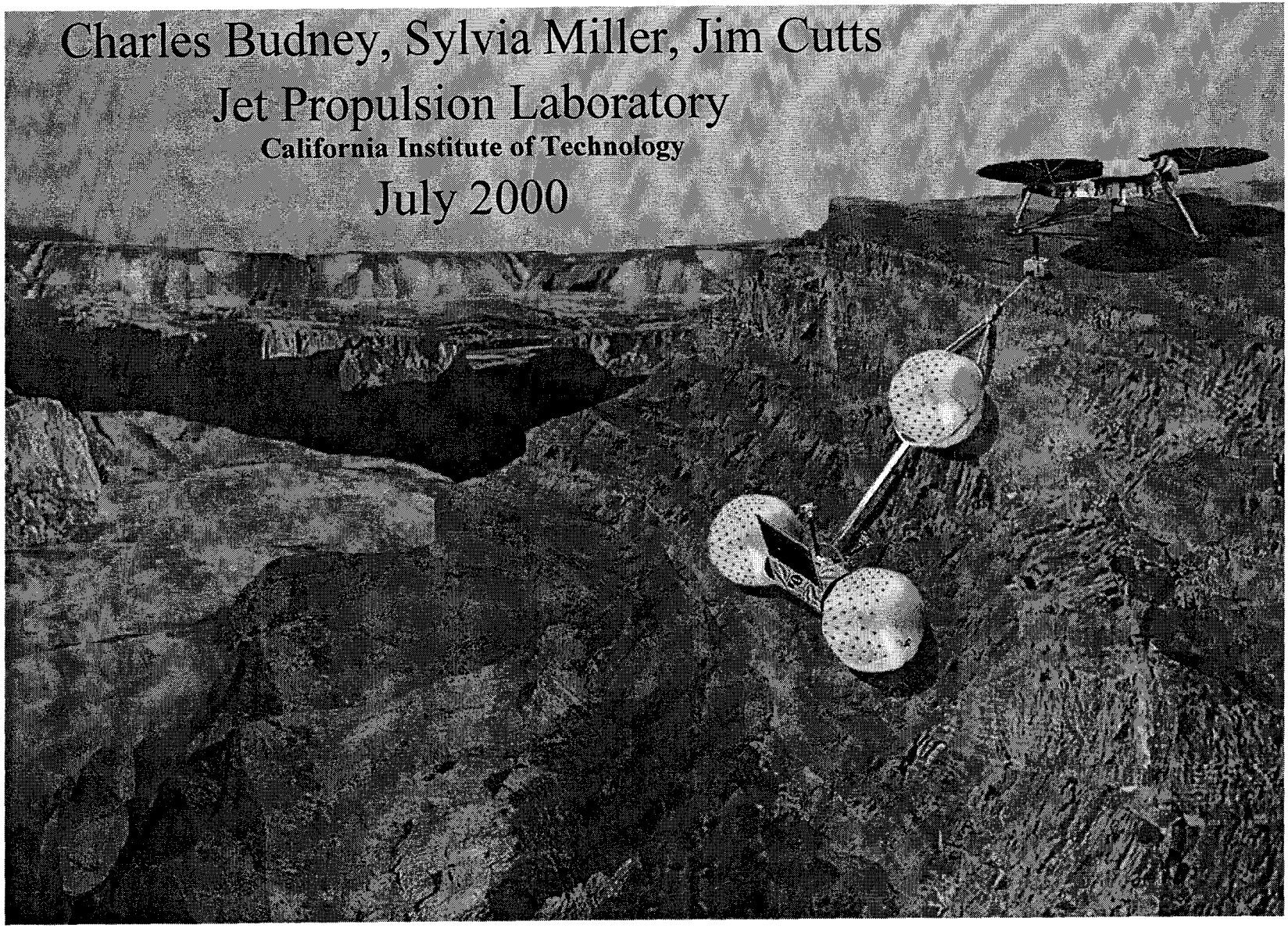
MARS STRATIGRAPHY MISSION



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Mars Stratigraphy Mission

Science

Science objectives

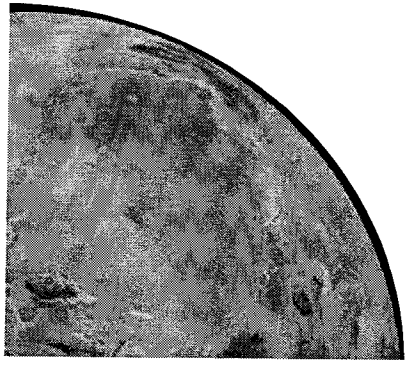
- Determine the geological history of the layered volcanic and sedimentary rocks of Valles Marineris
- Search for evidence of life within the deposits
- Elucidate the history of tectonic, volcanic, eolian and fluvial processes to characterize climate history
- Identify potential habitats for past and present Martian life

Candidate Instruments

- Stereo multispectral imager
- Raman spectrometer
- X-Ray Florescence Spectrometer
- Age dating instrument
- Instrument arm
- Mini-corer
- Sample manipulation assembly
- Calibration targets for imager and x-ray spectrometer

Science operations

- Multispectral imaging, Raman, and XRF analyses every meter
- Sample collection for age dating every 100 meters



Mars Stratigraphy Mission

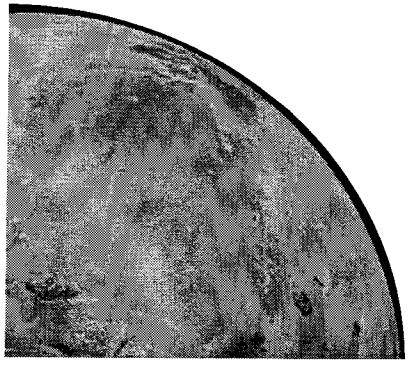
Mission

Scenario

- Landing site: 14S, 68W, near the southern canyon wall of Valles Marineris- 20 km circular landing zone
- Traverse to cliff top in <50 days
- Descend 2 km into the canyon on tether in 200 days
- Possible extended mission to canyon floor (6km, 400 days)

Geometry

- 10 km landing error
- Arrive and operate while the sun is north of about –10° declination



Trajectory

- Type IV
- C_3 of 12 km^2/s^2
- Flight time 30 months
- Arrival V_∞ ~6 km/s

Delta 7925

- LV capability ~975 kg for this C_3

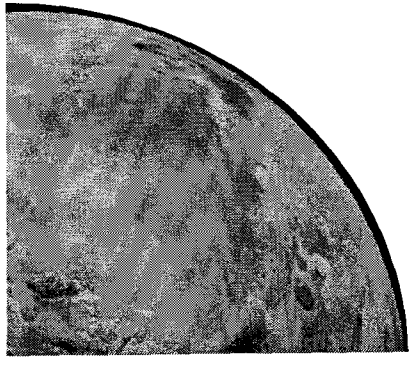
Earliest Launch dates

- April 2007 (assumes 20 day launch period)

Mars Stratigraphy Mission

Spacecraft

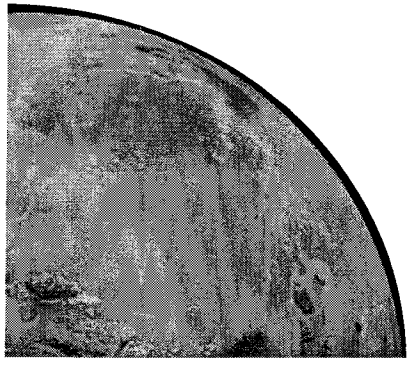
- Performance attributes
  - Land within 10 km of cliff
  - 20 km overland mobility
  - 6 km of cable to lower rover down cliff
  - Rover handles slopes from 0 - 90 degrees
- Flight system elements
  - Inflatable rover
    - Solar powered
  - Moderate lander
  - Entry system
    - Direct entry
- Margins
  - 30% mass/power contingency carried in design study
  - 40% (400 kg) mass margin



Mars Stratigraphy Mission

Technology / Infrastructure

- 2003 Technology Cutoff
- Critical Technology Needs
  - Precision navigation and landing
  - Long range mobility over hazardous terrain.
  - In situ instrumentation
  - Telecommunications
  - Light weight drilling and rock sampling devices



- Candidate Technology Demos
  - Precision navigation and landing (laser
  - Long range mobility over hazardous terrain.
- Infrastructure Needs
  - Relay Orbiter(s)
- Acknowledgements
  - Team X (study 8-99)
  - Kerry Nock, JJ Wu, Dave Farless, Bob Balaram, Steve Townes